

# Scleral contact lens correction of varying irregular astigmatism during corneal regeneration

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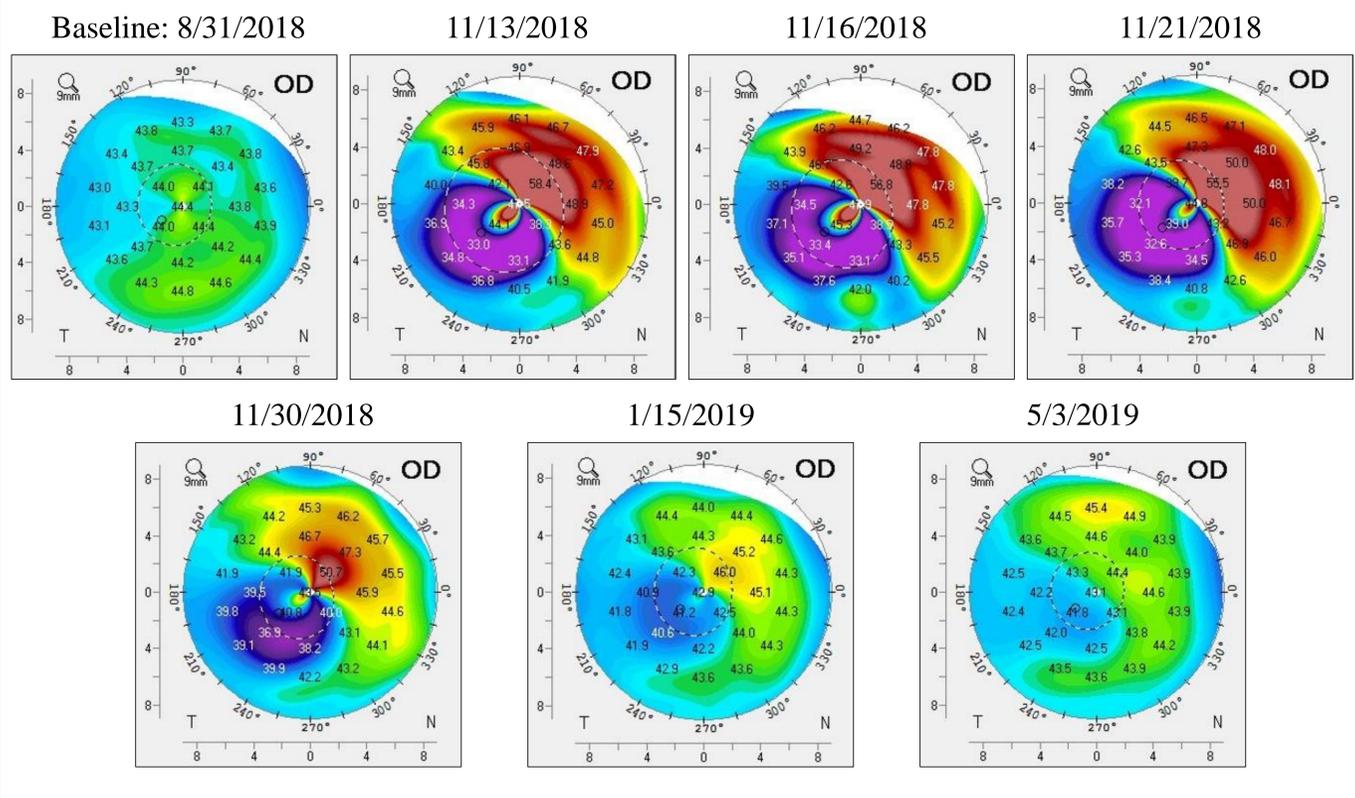
## Background

- Sterile ulceration, or stromal melt, occurs due to an imbalance between keratocyte production of collagen and collagenase breakdown.
- Sterile ulceration can result in significant corneal irregularity that will vary during stromal regeneration.
- Scleral lenses provide excellent refractive correction of irregular corneal astigmatism. Since they fit independently of corneal shape, they can also provide a management option for patients with changing irregular corneal astigmatism.

## Case Report

- A 48-year-old Caucasian female presented to the clinic suffering from moderate to advanced dry eye syndrome. Previous therapies included copious artificial tears, Xiidra BID, Pred Forte 1% BID-QID, and Bruder mask hot compresses. Clinical appearance and patient symptoms persisted despite several weeks of increasingly aggressive therapy.
- Patient underwent amniotic membrane therapy OD for management of recalcitrant dry eye syndrome. A sutureless, dehydrated amniotic membrane with BSCL was placed OD without complication in office. She returned the following day due to severe pain OD and was found to have developed a large corneal abrasion OD.
- During treatment of the corneal abrasion, the patient was found to have developed a sterile corneal ulceration, or stromal melt, secondary to the intense immune-mediated inflammatory response. The sterile ulceration resulted in significant corneal irregularity (Pentacam 11/13/2018)
- Following aggressive steroid therapy, the sterile ulceration was halted, and oral vitamin C was utilized to promote collagen synthesis and stromal regeneration.
- During the stromal regeneration, the patient experienced significant variability in her vision secondary to the changing corneal shape (Pentacam images). The corneal irregularity was corrected with scleral contact lens wear.
- Scleral contact lens wear provided correction of the varying irregular astigmatism during corneal regeneration providing the patient with relatively stable vision throughout her recovery. Scleral lenses wear as also provided good, long term control of the patient's dry eye syndrome.

## Serial Pentacam Topographies



| Date       | Pachymetry |
|------------|------------|
| Baseline   | 506 um     |
| 11/13/2018 | 296 um     |
| 11/16/2018 | 345 um     |
| 11/21/2018 | 353 um     |
| 11/30/2018 | 404 um     |
| 1/15/2019  | 454 um     |
| 5/3/2019   | 474 um     |

| Visual Acuity with Scleral Lenses |         |        |
|-----------------------------------|---------|--------|
| Date                              | OD DVA  | OS NVA |
| 11/30/2018                        | 20/20   | 20/20  |
| 12/15/2018                        | 20/20   | 20/25  |
| 12/26/2018                        | 20/25   | 20/25  |
| 1/15/2019                         | 20/20-2 | 20/25  |
| 5/3/2019                          | 20/30+2 | 20/25  |

## Final Scleral Lens Parameters

OD: BC: 8.23, Dia: 15.8, Pwr: +3.00, LCZ: STD: SLZ: 5/-2, Optimum Extra, Clear (Distance)  
 OS: BC: 8.23, Dia: 15.8, Pwr: +4.75, LCZ: -1.0 LL2, SLZ: 5/-2, Optimum Extra, Blue (Near)

## Discussion

- When faced with a stromal ulceration, there are 3 primary objectives: 1) Enhance corneal epithelial recovery, 2) Supplement collagen synthesis and minimize collagen breakdown, and 3) Control inflammation.
- The most common cause of sterile ulceration is alkali chemical injuries to the cornea. Alkali chemicals are able to penetrate deeper into the corneal tissue by sloughing away the protective layers of the cornea. The strong inflammatory response induced by large corneal abrasions can also result in sterile ulceration.
- Steroids suppress inflammatory cells and inhibit collagenase activity, but also suppress keratocyte migration and collagen synthesis. Therefore it is important to address the inflammatory reaction strongly at first with aggressive steroid therapy, but it needs to be tapered quickly so as not to delay collagen synthesis.
- Ascorbic Acid (Vitamin C) is a key co-factor in the rate-limiting step of collagen synthesis. Supplementation with topical 10% hourly or 1000-2000mg po daily will promote stromal regeneration.
- Scleral contact lenses provide excellent visual correction of irregular corneal astigmatism and their fitting is independent of corneal shape.
- **Clinical Relevance:**
  - Frequent monitoring of large corneal abrasion - initially and once the epithelial defect heals - is important to monitor for inflammation
  - Topical steroid – initially heavy, followed by a short taper – helps control waves of inflammation..
  - Ascorbic Acid (Vitamin C) supplementation promotes collagen synthesis to rebuild corneal stroma and can help to minimize corneal scarring.
  - Scleral lenses can provide stable visual correction during corneal regeneration

## References

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